WHY SWITCHING TO ON-SITE HYDROGEN LEADS TO BETTER RESULTS

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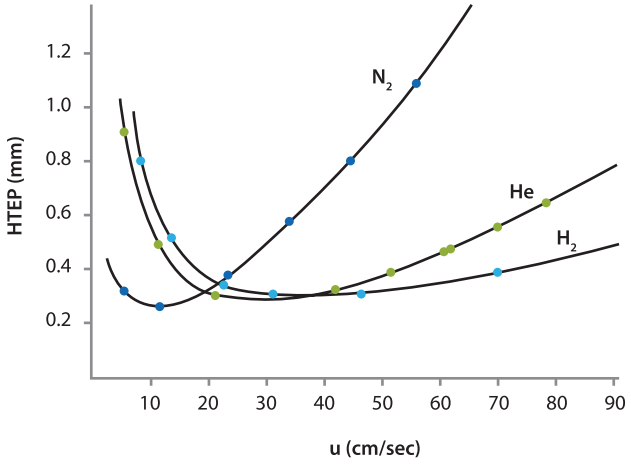
Laboratory practitioners need a carrier gas they can count on. But helium – traditionally used as a gas chromatography (GC) carrier gas – supplies are dwindling, forcing laboratories to pay more and risk a missed delivery of this ever more scarce gas.

Laboratories are increasingly looking for a more reliable and less expensive solution than helium gas. The only carrier gas that can offer higher reliability and lower cost – plus faster results – is hydrogen, made on-site. A hydrogen generator using a Proton Exchange Membrane (PEM) electrolyzer safely and reliably produces an endless supply of ultra-pure hydrogen at a fraction of the cost of delivered helium.

FASTER RESULTS WITH ON-SITE HYDROGEN

Hydrogen carrier gas offers the fastest GC results. The van Deemter equation, which predicts the optimum speed at which there will be the least variance per unit column length, shows that hydrogen's flow rate can be greater than helium's. The equation also proves hydrogen can just as efficiently separate peaks.



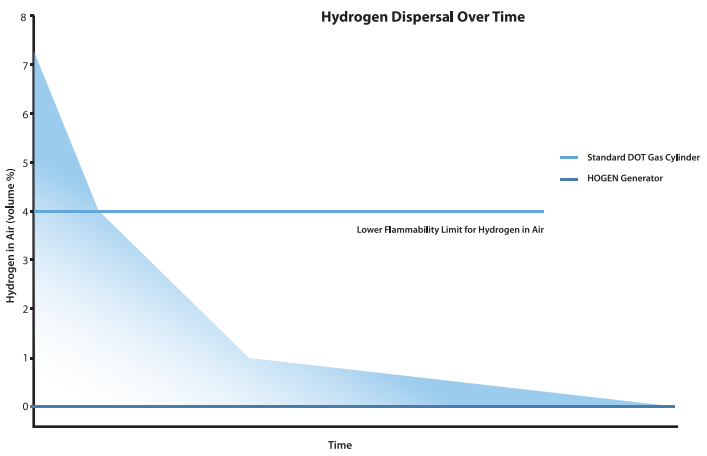
> *With hydrogen, our columns last longer. The traditional GC run is 140-160 minutes. But by switching to hydrogen and using high-efficiency columns, you can get run time down to 40 minutes. We've reduced the time of our GC runs by 25 percent, and that helps production*

- Bruce Williams
Senior Technical Advisor
Intertek

SAFETY ON-SITE

Not all hydrogen options are created equal. Laboratories that use cylinders of hydrogen gas struggle with storing potentially explosive cylinders and the added expense of complying with strict safety regulations. Generating hydrogen gas on-site is a safer option. A single, standard hydrogen cylinder storing 6,300 liters of gas has the explosive potential of 35 lbs. of TNT, while a Proton OnSite hydrogen generator contains less than three liters of hydrogen gas at any given time.

Because a Proton OnSite hydrogen generator contains drastically less hydrogen, it is incapable of creating the four percent hydrogen/air mix necessary for a space to become explosive. Even if a Proton's largest 'lab server' scale (19 SLPM) generator is left unchecked – accidentally or otherwise – a lab space would remain safe.

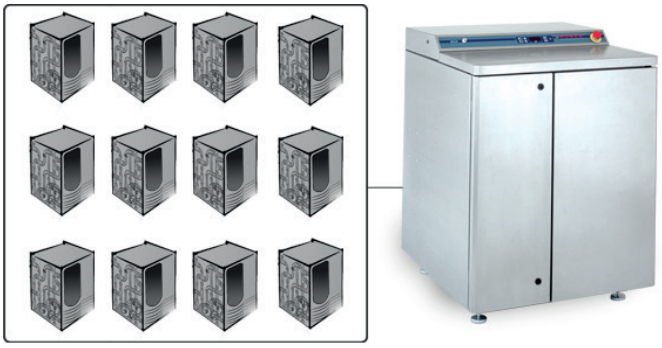


> *Safety concerns led us to install a Proton OnSite hydrogen generator, and the tangible benefits immediately became clear. We were able to reduce the amount of flammable gas volume in our building by more than 90 percent. It also freed up precious floor space and reduced physical injury risks associated with moving and connecting heavy cylinders, as well as reduced the time lost handling cylinders and changing regulators*

- Safety Expert
at a leading academic research institution

ONE LAB SERVER TO MANY LAB SYSTEMS

Generators are ideal for laboratories that need to provide carrier gas to multiple systems at the same time. Laboratories that use cylinders to support multiple systems can be logistically challenging, particularly when cylinders are shared across departments. Generators, on the other hand, can act as a hydrogen gas server, using a single generator to run several systems.



> *We would have had to purchase 20 small generators to meet our lab's demands and that would take up precious bench space. But a single Proton OnSite S-Series generator can produce as much as 18 SLPM of hydrogen, and even though we have 50 GC systems running, we usually only need between 11 and 15 SLPM of gas, so we certainly have room to grow.*

- Senior Lab Specialist
at leading International chemical manufacturer

PURER GAS FOR BETTER RESULTS

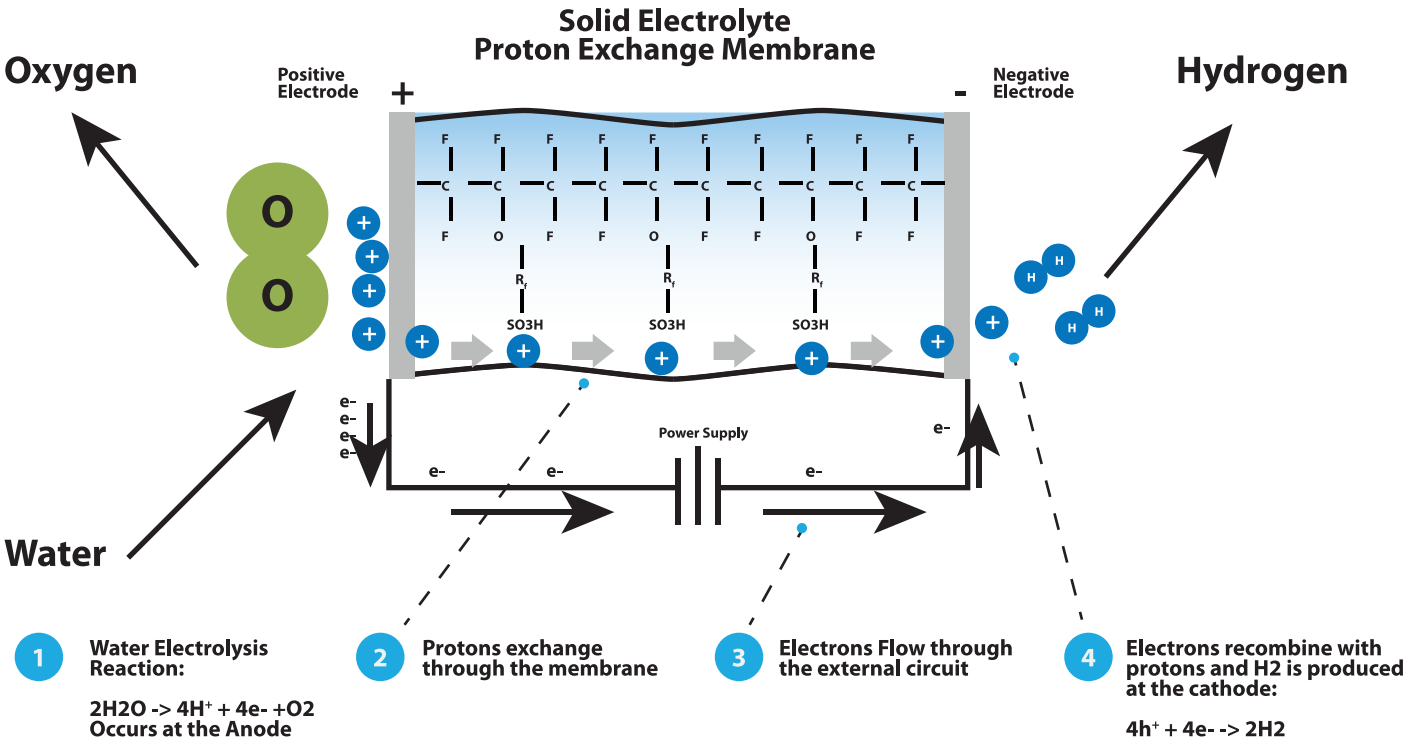
Proton OnSite's generators use advanced hydrogen gas purification, ideal for applications that need an ultra-pure carrier gas. GC applications, for example, analyze samples to such a high degree that even the smallest contaminant will affect results. An on-site generator using Proton's advanced gas purification ensures the hydrogen gas is 99.9999 percent pure, enabling the hydrogen carrier gas to produce superior results.

> *"Hydrogen as a GC carrier gas requires high purity due to the fact that water and oxygen in even trace amounts may damage the GC column stationary phase (PDMS) resulting in bad peak shape and excessive column bleed. Therefore the use of ultra-high purity (UHP, 99.999+%, 5.0) gas generated by an ultra-high purity hydrogen generator is strictly advised."*
>
> **- Yassin Hardi**
> GC-MS Specialist
> CHROMTECH

HOW ON-SITE GENERATION WORKS

Proton OnSite's hydrogen generation systems use a platinum catalyst and Proton Exchange Membrane technology to split deionized water into its constituent parts.

When a DC voltage is applied to the electrolyzer, water molecules at the anode are oxidized to oxygen and protons, while electrons are released. The protons (H+ ions) pass through the PEM to the cathode where they meet electrons from the other side of the circuit, reducing to hydrogen gas.



WHY PROTON ON-SITE TECHNOLOGY

Proton OnSite has more than 15 years of expertise creating commercially successful hydrogen generators. The world's largest supplier of hydrogen gas generators has deployed its technology on every continent in a variety of environments, from refueling stations and military bases to power plants and semiconductor manufacturing facilities.

Ongoing research and development efforts have resulted in reliable systems that have evolved from military and aerospace platforms to produce ultra-pure hydrogen to support critical commercial missions. The expertise and experience Proton OnSite brings to its generators ultimately gives laboratory practitioners a carrier gas that's pure, safe, inexpensive and produced at the flick of a switch.